

**HOPLOSEIUS AUSTRALIANUS SP. NOV. (ACARI:  
MESOSTIGMATA: ASCIDAE), A UNIQUE ELEMENT IN THE  
AUSTRALIAN ACAROFAUNA**

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**Abstract**

Mites in the genus *Hoploseius* Berlese inhabit fungi in North America, Africa, India and Indonesia. *Hoploseius australianus* sp. nov. is described from polypore shelf fungi in south-east Queensland. The new species shares characters with *H. bakeri* Lindquist from Central Africa and *H. sitalaensis* Bhattacharyya from West Bengal, India, that suggest an ancient Gondwanan origin of this species-group.

**Introduction**

Fifteen of the 35 described genera of ascid mites have been reported from Australia (Halliday *et al.* 1998, Walter 1998) and many can be found in rotting fungal sporocarps, where they prey on the nematodes, mites and insect larvae that develop as the sporocarps decay. Some lineages of ascid mites, however, appear to have adapted to feeding on fungi and to have lost their predatory habits. For example, *Hoploseius tenuis* Lindquist has a narrow, elongate body and lives within the pores of polyporous fungi in North America, apparently using rasps on the tips of its chelicerae to feed on the walls of the pore tube (Lindquist 1965). The four other described species in the genus lack the elongate body form of *H. tenuis*, but all have similar cheliceral rasps and all have been found in association with fungi or phoretic on insects associated with fungi. The type species, *Hoploseius cometa* Berlese, was collected from a fly in Java and from polypores in Sumatra; *H. drosophili* (Chant) from *Mycodrosophila* flies in North America; *H. bakeri* Lindquist from shelf fungi in the Congo; and *H. sitalaensis* Bhattacharyya from '*Agaricus* sp.' in India (Berlese 1910, Bhattacharyya 1977, Chant 1963, Lindquist 1963, Vitzthum 1925). Herein, the first known Australian species in the genus is described from collections of polyporous shelf fungi in south-east Queensland.

**Materials and Methods**

Mites were cleared in Nesbitt's solution and mounted in Hoyer's medium or PVA on microscope slides (Krantz 1986). Measurements (minimum-maximum in  $\mu\text{m}$ ) were made from slide-mounted specimens using a stage-calibrated ocular micrometer. Lengths of shields were measured along their midlines, setae from the bases of their insertions to their tips and legs from the base of the coxa to the tip of the pretarsus. The systems of notation used follow those of Evans (1963) and Lindquist and Evans (1965).

***Hoploseius australianus* sp. nov.**

(Figs 1-11)

*Material Examined.* QUEENSLAND: *Holotype* ♀, from white polypore shelf fungus on log above Enoggera Creek, Scrub Creek Road, Mt Glorious (27°26'S, 152°51'E),

27.iii.1996 (in Queensland Museum [QM]). *Paratypes*: 12 ♀♀, 3 ♂♂ same data as holotype; 9 ♀♀ from shelf-like, white polypores on log above Lobster Creek, Conondale Ranges (26°39'S, 152°37'E), 20.i.1995, 20.xi.1996; 1 ♀, from polypore on log at Paradise Falls, Bunya Mounts National Park (26°52'S, 151°35'E), 13.ii.1996 (in Australian National Insect Collection, Canberra; University of Queensland Insect Collection, Brisbane; Western Australian Museum, Perth and Canadian National Collection of Insects and Arachnids, Ottawa).

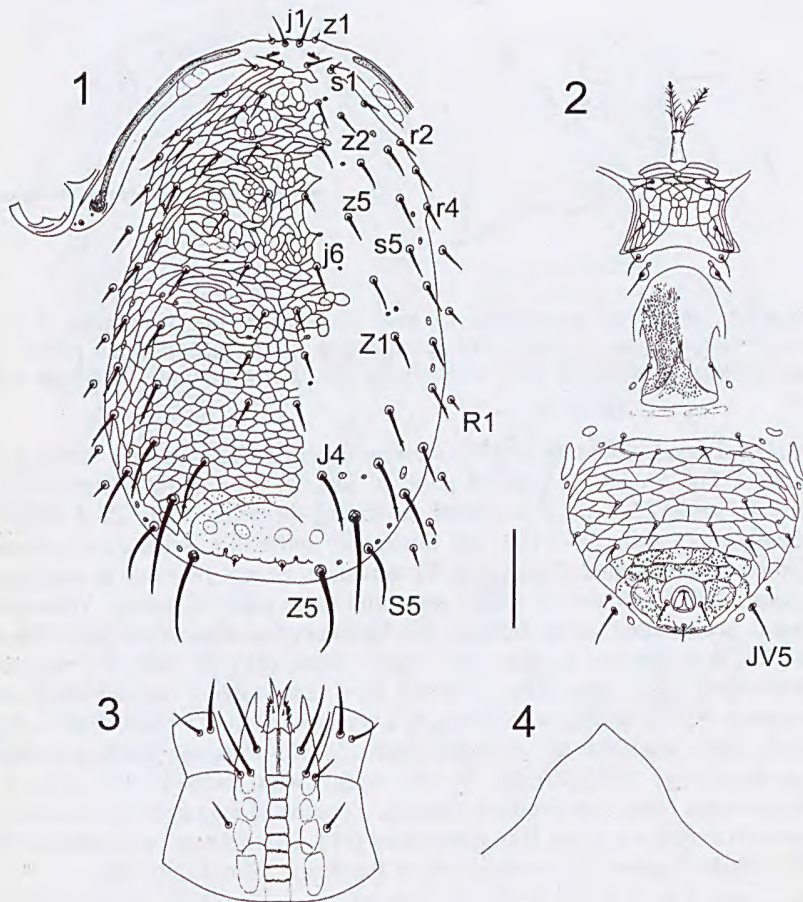
*Diagnosis.* Adults of both sexes with dorsal shield seta  $z_3$  absent, genu IV with 9 setae, tibia IV with 10 setae; tritosternal laciniae inserted in denticulate collars; fixed digit with a curved, terminal rasp; leg II robust, much thicker than others and with seta *av* of femur, genu and tibia swollen and spine-like. Adult females with 35 pairs of mostly simple dorsal shield setae ( $r_2-4$  on shield); *J4*, *Z1-3* and *S1-5* simple to weakly tricarinate; ventrianal shield with 13 setae (*JV4-5* in soft cuticle); basifemur III with spine-like ventral seta.

*Description of female.* Dorsal shield (480-540) ornamented with elongate cells antero-medially, colliculate laterally and posteriorly, punctate posterior setae *J4-Z4*, and bearing 35 pairs of simple to weakly tricarinate setae (Fig. 1); seta  $z_3$  absent; setae  $r_2-4$  (15-20) on lateral margin of shield. Anterior setae *j1-5*,  $z_2$ ,  $z_4-6$ , and  $s_3-6$  simple (19-21); *z1* (11), *s1-2* (11-13) short, simple; seta *j6* (20) simple to weakly tricarinate. Posterior setae *J1-3* (17-25) simple, *J4* (41-46) tricarinate, *J5* (9) short, spine-like, barbed basally; *Z1-3* (22-26, 33-35, 50-55, respectively) tricarinate, *Z4* (80-90) and *Z5* (74-75) simple, elongate; *S1-3* (20-26) simple to weakly tricarinate, increasing in length posteriorly, *S4-5* (55-60) simple, subequal. Marginal setae  $r_5-6$  and *R1-4* simple, in soft cuticle laterad shield. Peritremes reach to about level of *s1*.

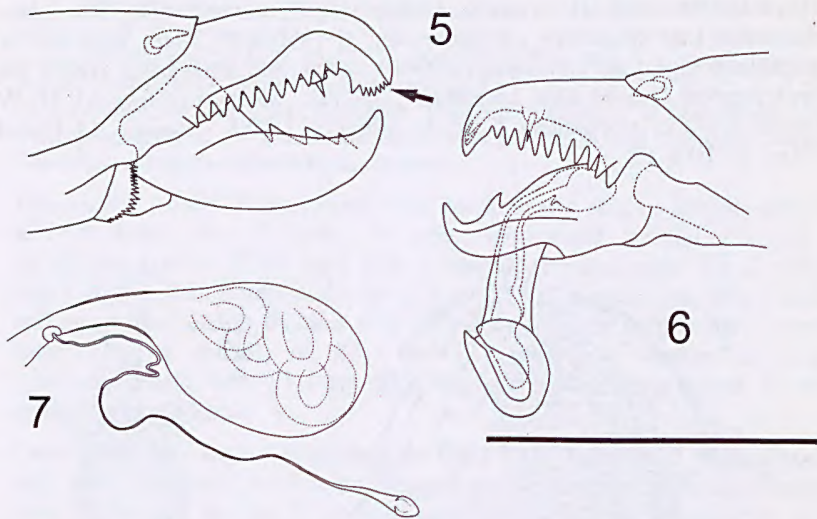
Sternal shield (Fig. 2) reticulate, bearing simple setae *st1-3*, pores *stp1-2* and lineate sclerotised presternal lobes; metasternal plates drop-shaped, with *stp3* and simple *st4*; epigynial shield punctate, bearing simple *st5*, pores in soft cuticle laterad shield; ventrianal shield subcordate, reticulate, punctate in posterior third, with five pairs of simple ventral setae (*JV1-3*, *ZV2-3*), simple paranal setae; simple postanal seta, small anal opening (17), and narrow cribrum of two rows of denticles. Ventral setae *ZV1* (11), *JV4* (12), and *JV5* (35) simple, in soft cuticle.

Tritosternum (80-84) with strongly plumose laciniae (47-50) and denticulate basal collars. Deutosternum (Fig. 3) with 7 rows each of 6-20 denticles; hypostomal setae simple, palp coxal and external setae short (10-14), anterior and internal setae long (27-32); corniculi simple; epistome (Fig. 4) smooth, subtriangular; palp apotele 2-tined. Second cheliceral segment (105) ending in fixed digit with row of 11-12 teeth and distal rasp with 6-8 teeth, spine-like pilus dentilis, and flattened cheliceral seta (Fig. 5); movable digit (39-42) with three teeth. Vesicle of spermathecal apparatus sac-like (73 by 32); calyx not distinct; long minor duct ending in small bulb (Fig. 7). Legs I and

IV (360-430) subequal, longer than others; leg III shortest (280-330), seta *av* thickened and spine-like on femur; leg II (350-400) stout, with seta *av* thickened, blunt and spine-like on femur, genu, and tibia; basal ventral seta on telotarsus II spine-like, acuminate (Fig. 11). Setation of legs I-II-III-IV: coxae 2-2-2-1; trochanters 5-5-5-5; femora 12-10-6-7; genua 11-11-9-9; tibiae 11-10-8-10.



**Figs 1-4.** *Hoploseius australianus* sp. nov., adult female: (1) dorsal shield; (2) ventral shields; (3) subcapitulum; (4) dorsal epistome. Scale bar = 50  $\mu$ m for 1-2, 100  $\mu$ m for 3-4.



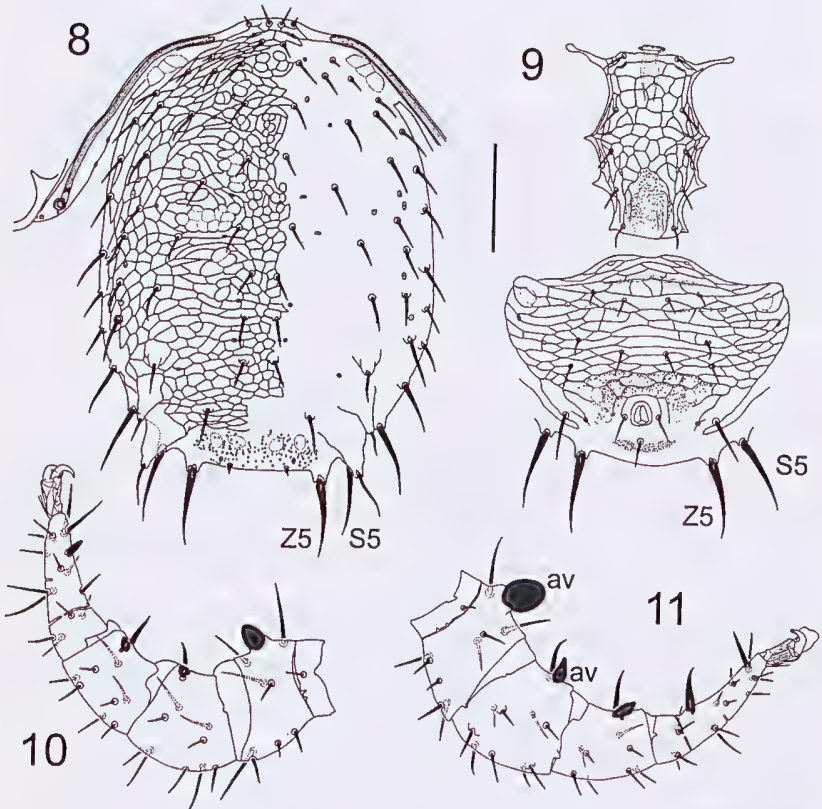
**Figs 5-7.** *Hoploseius australianus* sp. nov.: (5) paraxial view of chelicera of adult female (arrow points to rasp); (6) paraxial view of chelicera of adult male; (7) spermathecal apparatus of adult female (with four spermatophores). Scale bar = 50  $\mu$ m.

**Male.** Dorsal shield (410-430) similar in ornamentation and setation to female (Fig. 8) except with 39 pairs of setae (*r*5-6 and *R*1-2 captured by shield); setae *Z*2-5, *S*4-5 produced on strong tubercles; setae *Z*2-4 slender, attenuate, *Z*5 (80), *S*4-5 (60, 70) thickened, spine-like; setae *J*1-4 sparsely barbed. Sternigenital shield (Fig. 9) reticulate, except punctate in epigynial region, with five pairs of simple setae and three pairs of pores. Ventrianal shield ornamented as in female, but broader, fused posteriorly to dorsal shield, and bearing 6 pairs of ventral setae (*J*V1-3, *J*V5, *Z*V1-2) and circumanal setae; setae *Z*V3, *J*V4 and *R*3-4 suppressed. Second cheliceral segment (90-91) ending with fixed digit with row of 10-11 teeth, distal offset tooth, and chisel-like tip; movable digit (35-36) with one tooth and thick spermatodactyl (15-17 long by 12 wide) with bulbous tip (Fig. 6). Gnathosoma otherwise similar to female. Setation of legs as in female except spine-like setae on tarsus II in distal third (Fig. 10); *ad* seta on basitarsus III, IV thickened, spine-like; ventral seta on basifemur III not spine-like.

### Discussion

The genus *Hoploseius* Berlese contains three distinct clusters of species. The unique, elongate body and extensive setal suppressions in *H. tenuis* (Lindquist 1965, 1995) set it aside from all other described species in the genus. Among the five species with oval bodies, adult females of *H. cometa* and *H. drosophilii* both express seta *z*3 and have broad ventrianal shields with

7 pairs of ventral setae (*JV1-5, ZV2-3*); males are undescribed (Lindquist 1963). The remaining three species (the *bakeri* group), *H. bakeri*, *H. sitalaensis* and *H. australianus*, do not express seta *z3* (normally added in the deutonymph), have subcordate ventrianal shields with five pairs of ventral setae in the adult females (*JV4-5* are in the soft cuticle) and share a Gondwanan distribution.



**Figs 8-11.** *Hoploseius australianus* sp. nov.: (8) dorsal shield of adult male; (9) ventral shields of adult male; (10) leg II of adult male; (11) leg II of adult female. Scale bar = 50  $\mu$ m.

Adult males and females of the three *bakeri* group species are very similar in general appearance; however, adult females of *H. sitalaensis* are reported to have 6 setae on genu IV and 7 setae on tibia IV (Bhattacharyya 1977), versus

9 and 10, respectively, in the other two species. Additionally, adult male *H. sitalaensis* have a large, hooked spine on tibia IV (vs a smaller, tapering spine) and thickened, acuminate dorsal shield setae *J4* (vs an unthickened, tricarinate *J4*). Adult females of *H. australianus* differ from *H. bakeri* in having a spine-like ventral seta on basifemur III and in being considerably larger than the African species. The dorsal shields of adult female *H. australianus* average 14% longer ( $510 \pm 4 \mu\text{m}$ ) than those of *H. bakeri* ( $447 \mu\text{m}$ ), indicating that the Australian species is about 50% greater in mass. Also, adult males of *H. bakeri* have a spine-like, subapical dorsal seta on tarsus III (Lindquist 1963), but in males of *H. australianus* this seta is only slightly thicker than the other setae.

I have observed swarms of *H. australianus* with their mouthparts pressed to the undersurface of the white shelf fungus they inhabit. No fungal material is evident in the gut of any of the mites examined and the small anal opening ( $17 \mu\text{m}$ ) is appropriate only for the elimination of liquid faeces; therefore, these mites appear to feed only on fungal cell contents obtained by shredding tissue with the cheliceral rasps. As the polypores decay, *H. australianus* numbers decline, suggesting that live, actively growing shelf fungi are needed for survival and reproduction.

## References

- BERLESE, A. 1910. Brevi diagnosi di generi e specie nuovi di Acari. *Redia* 6: 346-88.
- BHATTACHARYYA, S.K. 1977. New species of *Hoploseius* and *Pseudoparasitus* (Acarina: Mesostigmata) from India. *Indian Journal of Acarology* 1: 1-5.
- CHANT, D.A. 1963. The subfamily Blattisocinae Garman (=Acoosejinae Evans) (Acarina: Blattisocidae Garman) (=Acoosejidae Baker & Wharton) in North America, with descriptions of new species. *Canadian Journal of Zoology* 41: 243-305.
- EVANS, G.O. 1963. Observations on the chaetotaxy of the legs in the free-living Gamasina (Acari: Mesostigmata). *Bulletin of the British Museum (Natural History), Zoology* 10: 275-303.
- HALLIDAY, R.B., WALTER, D.E. and LINDQUIST, E.E.. 1998. Revision of the Australian Ascidae (Acarina: Mesostigmata). *Invertebrate Taxonomy* 12: 1-54.
- KRANTZ, G.W. 1986. *A Manual of Acarology*. Second edition, 1978, emended 1986. Oregon State University Book Stores, Corvallis, Oregon USA.
- LINDQUIST, E.E. 1963. A taxonomic review of the genus *Hoploseius* Berlese (Acarina: Blattisocidae). *Canadian Entomologist* 95: 1175-85.
- LINDQUIST, E.E. 1965. An unusual new species of the genus *Hoploseius* Berlese (Acarina: Blattisocidae) from Mexico. *Canadian Entomologist* 97: 1121-1131.
- LINDQUIST, E.E. 1995. Remarkable convergence between two taxa of ascid mites (Acari: Mesostigmata) adapted to living in pore tubes of bracket fungi in North America, with description of *Mycolaclaps* new genus. *Canadian Journal of Zoology* 73: 104-128.
- LINDQUIST, E.E. and EVANS, G.O. 1965. Taxonomic concepts in the Ascidae, with a modified setal nomenclature for the idiosoma of the Gamasina (Acarina : Mesostigmata). *Memoirs of the Entomological Society of Canada* 47: 1-64.
- VITZTHUM, H.G. 1925. Fauna sumatrensis. (Beitrag No. 5). Acarinae. *Supplementa Entomologica* 11: 1-79.
- WALTER, D.E. 1998. *Ectoantennoseius kitchingi*, n. gen., n. sp. (Acari: Mesostigmata: Ascidae) from the rainforest canopy in Australia and a cladistic hypothesis about its relationships. *International Journal of Acarology* 24: 45-51.